having tried everything between 5¼ in. cranks with a 54 in. wheel, and my present machine with 10½ in. cranks and 108 in. gear, I can now travel greater distances and climb steeper hills with less effort on a 42 lbs. bicycle than when riding a 28 lbs. machine fitted with 6½ in. cranks and 66 in. gear. I intend to try 11 in. cranks and 120 in. gear, but this necessitates my getting a longer and heavier machine, and it is probable that I shall lose as much as I gain.

The extraordinary ankle-play developed by long-crank men improves their walking; and, after a long hard ride, the difference between their swinging elastic step and the muscle-bound hobble of the short-crank riders is very striking.

Instead of Crompton foot-plates I have just fixed a flanged clip to each pedal, so that the inner edges of the soles of my shoes can be pushed under the clips; and they are almost as comfortable and efficient as the "Otto" straps of years ago.

WM. H. MASSEY.

Twyford, Berkshire, February 17.

Indian Corn.

IN the "Encyclopædia Britannica," vol. xv. p. 309, it is stated that no mention was ever made of maize by Eastern travellers in Africa or Asia prior to the 16th century A.D. Slight doubts about this statement have occurred to my mind lately, while I was reading the Hakluyt Society's "India in the Fifteenth Century." There, in the English translation by the late Count Wielhorsky of the "Travels" of Athanacius Nikitin, the Russian, whose Eastern travels took place about 1470-1474, when the work was written by himself, we read concerning the Indians: "They live on *Indian corn*, carrots with oil, and different herbs" (p. 17). Has this mention of the cereal any weight to countenance the theories which seek to assert that maize was known in the East before the discovery of the Western Continent? Or, does what is meant or translated by the word *Indian corn* here differ materially from *Zea Mays?*

Apropos of these queries, I may mention that A. de Candolle is in error in his post-dating the introduction of maize into Japan on the sole ground that Kaempfer (who was there during 1690-92) does not mention it.[1] According to a native work (Kikuoka, "Kindai Sejidan," 1733, lib. 2, § 4), maize was introduced into the islands about the beginning of the period of Tenshô (1573-91). After Sweet Sorghum (*Sorghum saccharatum*), of earlier introduction with the name *Morokoshi-Kibi* (*i.e.* Chinese-Millet), maize was called *Tô-Morokoshi* (*i.e.* Chinese Chinese-Millet) in the eastern provinces, where, of course, its propagation followed that in the western parts. In the dialect of the latter, where the people were more directly concerned with its introduction, maize was named *Nanban-Kibi*, or Millet of the Nambans (Spaniards and Portuguese), who were entirely excluded from the empire since 1639, which thus would stand as latest possible date of the introduction.

KUMAGUSU MINAKATA.

1 Crescent Place, South Kensington, S.W.

The Production of Electrolytic Copper.

IN a note on the production of electrolytic copper, on p. 371 of NATURE of February 15, it is stated that "Mr. S. Cowper-Coles has hit upon a new plan, in which the copper is deposited on a vertical mandril, which is caused to rotate at a very rapid rate. . . . As a consequence, a smooth and dense deposit has been obtained with current densities approaching 200 ampères per square foot." In reference to this I should like to point out that the idea of rotating the kathode with a view to obtaining greater rates of disposition is an old one. We have had in use at the Owens College for the last seven years a copper depositing tank in which the kathode consists of a vertical mandril 9 inches long and 3 inches diameter kept in rapid rotation, and capable of receiving a good copper deposit with a current of 100 ampères. The arrangement was devised by Mr. Henry Wilde, F.R.S., to illustrate the working of his patent, No. 4515, of 1875, and differs little from that used by Mr. Cowper-Coles. The mandril is driven from above, so that a stuffing-box in the bottom of the tank is unnecessary. CHARLES H. LEES.

The Owens College, Manchester, February 19.

[1] "Origin of Cultivated Plants," p. 392.

THE WEST INDIAN AGRICULTURAL CONFERENCE.

THE second West Indian Agricultural Conference was opened on January 6 in the hall of the House of Assembly, Barbados, under the presidency of Dr. D. Morris, C.M.G., Imperial Commissioner of Agriculture for the West Indies. There were forty representatives present, including the heads of all the Botanical, Chemical and Educational Departments, as well as the representatives of the principal Agricultural Societies in the West Indies. Some of these gentlemen had journeyed for the best part of a week to take part in the two days' labour that awaited them.

The representatives were received in the hall of the House of Assembly at 10.30 a.m. by his Excellency Sir James Shaw Hay, the Governor, who opened the conference with a short address of congratulation to the Department of Agriculture, and of welcome to the visitors from other Colonies.

The President then delivered his address, which summarised the work done by the Imperial Department during the preceding year, and alluded to some of the problems which were expected to be discussed at the conference: the best seedling canes and their record, Imperial aid for co-operative central factories, reducing cost of cultivation, subsidiary industries which have done so much for Jamaica, Trinidad and Grenada, agricultural education and treatment of diseased plants, were subjects that came under review.

Prof. J. B. Harrison (British Guiana) then read a paper, "Notes on Sugar Cane Experiments," the joint production of Mr. G. S. Jenman and himself, followed by one, entitled "Past and Future Work in Sugar Cane Manurial Experiments," by Prof. d'Albuquerque (Barbados). Both papers covered somewhat the same ground, and were followed by a long discussion. It was generally agreed that nitrogen is the constituent of cane manures which chiefly governs the yield; but the experiments upon the use of phosphatic manures have been contradictory in different places. The application of potash and lime to cane fields gives profitable results in soils where these constituents of plant food are deficient. A discussion of considerable length took place upon the best and most economical way to conserve and utilise the nitrogen and mineral constituents of plant food in farmyard manure; and the desirability of extended trial of leguminous green dressing was urged upon West Indian planters.

Prof. d'Albuquerque, in the next paper, explained "A Method of using Control Plots in Experimental Field Cultivation." The method, which is only applicable where small plots of, say, one-thirtieth of an acre are used, partly consists in weighing the crops from a number of small no-manure (control) plots not far apart, and calculating the no-manure yield of the intervening plots on the assumption that in a uniform field the change of fertility is continuous from one control plot to the near next one. The other part of the method depends upon the manipulation of the figures obtained from the manured plots in relation to the calculated no-manure yields, and the interpretation of results.

The same author in the next paper, "The Possibility of Improving the Sugar Cane (*a*) by Artificial Cross-fertilisation, (*b*) by Chemical Selection of 'Seed Cane,'" under the first head argued that crossing different varieties would lead to the production of canes possessing desirable characters derived from both parents, and detailed some methods by which systematic experiments should be carried out. The second part of the paper dealt with the feasibility of increasing the sugar productiveness of a given variety of sugar-cane by propagating it with tops cut from canes richer than the average of the variety; the practical difficulty is to find a sure test of an inherently rich cane, as opposed to a cane rich because it is riper or more favourably situated.

Mr. J. R. Bovell (Barbados), in his papers on "Rotation and Catch Crops on Sugar Estates" and "Green Manuring as a means of Fertilising Cane-lands in the West Indies," illustrated by plants, seeds, tubercles, &c., brought forward useful information on the yields and values of food crops in Barbados, and the capability of sugar estates of self-support in regard to cattle food, and a useful *résumé* on the relative value of different leguminous plants. Mr. E. E. H. Thorne (Barbados), in "Silos on Sugar Estates in Barbados," gave a valuable account of actual results, and a number of useful practical hints. The Hon. F. J. Clarke (Barbados) and the Hon. Francis Watts (Antigua) gave a history for Barbados and Antigua of the efforts of the planters to erect central co-operative factories; both agreed as to the absolute necessity for improved manufacture if the industry is to survive, and as to the difficulty, so long as bounties last, in enlisting any but Government guaranteed capital, notwithstanding the certainty of a very profitable investment even at present prices.

The conference adjourned at 5 p.m., having devoted the entire day to subjects connected with the sugar industry.

A conference dinner was held the same evening at the Marine Hotel, at which about sixty guests were present. The following day, Sunday, afforded an opportunity of visiting the experimental stations, and a pleasant afternoon was spent at the "At Home" given by Mrs. Morris at "Chelston."

On Monday morning, at nine, the labours of the conference were resumed; the day was devoted to educational and general subjects. A long and important discussion took place upon measures for the inspection and treatment of imported plants in reference to plant diseases. The questions submitted were: Shall any or all of the following measures be adopted by legislative enactment?:—

(*a*) Total prohibition in certain cases.

(*b*) Inspection at port of entry, with power to destroy, quarantine or treat infected plants.

(*c*) Certificate from shipper declaring plants to be free from infection, countersigned by an inspector at shipping port; and while no definite agreement was come to, there was a consensus of opinion in favour of the Legislatures giving special powers to their respective Executives.

The papers read on educational subjects were: "Teaching Agriculture in High Schools and Colleges," by Mr. H. Deighton (Barbados) and the Rev. W. Caroll (Trinidad); "Teaching Agriculture in Elementary Schools," the Rev. J. E. Reece, Colonel Hicks, Mr. William Blair, Mr. Collens, Mr. Watkins and Mr. Hudson; "School Plots as Aids in Teaching Agriculture in Elementary Schools," Hon. W. Fawcett (Jamaica); "Experiment Station Work in Trinidad," Mr. J. H. Hart (Trinidad); "Aims and Objects of Experiment and Teaching Stations," Rev. Canon Simms (Jamaica). The subject of teaching agriculture in elementary schools was exhaustively treated. The paper by Canon Simms gave an interesting summary of observations on experimental stations and agricultural colleges in the United States of America and Canada during his recent tour, and very practical suggestions for higher agricultural teaching at Jamaica.

The Hon. Francis Watts, in his "Food Supplies of the Leeward Islands," gave a useful account of the food-growing resources of those islands; urged less importation of food-stuffs and more local production. He pointed out the close connection between cheap food and the abundant cheap labour so necessary in cane-growing countries, and brought forward evidence to show the "irrational" nature of the present diet, and how, by the proper combination of local products, it could be rendered "rational."

The Hon. William Fawcett (Jamaica) read an important paper on "Distribution of Economic Plants in Relation to Agricultural Development"; and other papers were read on "Steps taken at the St. Vincent Botanic Station for the Distribution of Seeds, Plants, &c., after the Hurricane of 1898," Mr. Powell; "Suggestions for Increasing the Usefulness of the Botanic Stations," Dr. Alford Nicholls; "Packing Seeds and Plants," Mr. J. H. Hart; "Bee-keeping in Jamaica," Mr. T. R. Doidge.

During the day the Chemical Section of the Conference presented a report upon uniformity in returning the results of field experiments on the sugar-cane, and upon some minor matters of detail.

A vote of thanks to the President, and the usual compliments, brought the conference to a close about 5 p.m. The representatives embarked the same night.

J. P. D'ALBUQUERQUE.

MODERN LIGHTHOUSE APPARATUS.

THE development of the modern system of lighthouse apparatus and illumination may be said to have originated in the mercury-float mechanism, devised in 1890 by the late M. Bourdelles, Director-General of the Central Lighthouse Service of France. Fig. 1 is a drawing of a lighthouse apparatus fitted with M. Bourdelles' mercury-float mechanism.

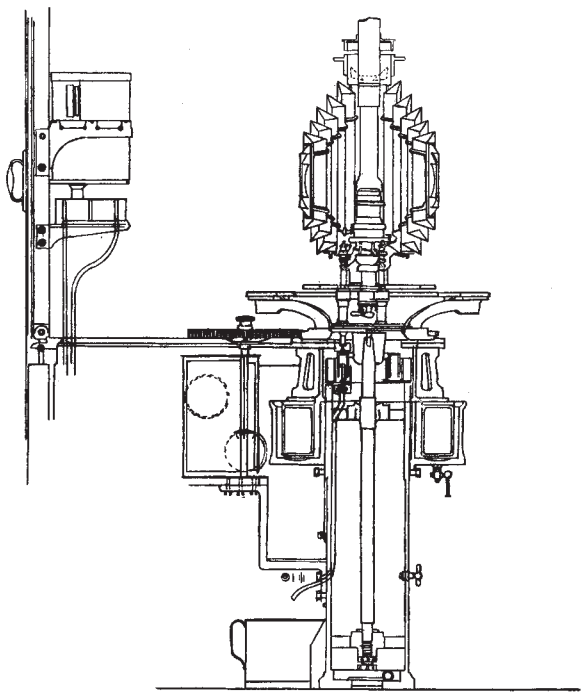

FIG. 1.—Feu-éclair. Third order apparatus. (Section.)

In place of the roller or ball bearings employed in the past for revolving apparatus, an annular trough is employed, in which there floats a second annular trough, on which is carried the dioptric apparatus. In order to steady the revolving superstructure, and to render it capable of a certain amount of adjustment, a vertical spindle projects downwards from the apparatus through the mercury trough to some distance below it, and is supported and guided upon suitable bearings.

Such is briefly the invention of the mercury-float mechanism, and it is clear that with only fluid friction to